

Attorney Docket No. LMND.P044DC

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In the Claims

Claims 1-56 (Previously canceled).

1 57. (Previously added) A micro-dissection catheter for crossing vascular
2 occlusions, comprising:
3 a catheter shaft including a distal end and a longitudinal axis having at least one
4 lumen extending along the longitudinal axis of the catheter shaft;
5 an assembly at the distal end of the catheter shaft including at least one jaw, the
6 jaw comprising a free distal tip and an interior surface which continuously mates to a
7 component of the assembly, wherein the interior surface is atraumatic; and
8 an actuation assembly positioned along the catheter shaft, the movement of which
9 spreads the jaw and brings the free distal tip in contact with tissue of a blood vessel wall
10 and applies a force to the tissue that separates material of the vascular occlusion of the
11 blood vessel, wherein the jaw spreads by moving through an arc away from the
12 longitudinal axis of the catheter shaft with respect to a fixed pivotal position of a
13 proximal end of the jaw.

1 Claim 58. (Previously withdrawn)

1 59. (Previously added) The catheter of claim 57, wherein only an exterior
2 surface of the jaw contacts the tissue during spreading and subsequent closing of the jaw.

1 60. (Previously added) The catheter of claim 57, wherein the material of
2 the vascular occlusion includes atherosclerotic plaque.

1 61. (Previously added) The catheter of claim 57, wherein the assembly
2 further includes a fixed extension that extends to a common point concurrent with the
3 free distal tip of the jaw when in the closed position, and wherein the proximal end of the

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4 jaw is connected to the fixed extension with a hinge pin to permit the free distal tip of the
5 jaw to move away from the fixed extension.

1 Claim 62. (Previously withdrawn)

1 63. (Previously added) The catheter of claim 57, wherein the jaw includes
2 an integrally formed hinge.

1 64. (Previously added) The catheter of claim 57, wherein at least one of the
2 jaw and the assembly include at least one component of a hinge.

1 65. (Previously added) The catheter of claim 57, wherein the jaw is coupled
2 to the assembly with at least one hinge pin to form at least one hinge that supports
3 rotation of the jaw via force applied to the actuation assembly.

1 Claims 66-67. (Previously withdrawn)

1 68. (Previously added) The catheter of claim 57, wherein separating
2 material of the vascular occlusion includes at least one of fracturing the vascular
3 occlusion, stretching tissue of a vessel wall that includes the vascular occlusion to create
4 a path between the vascular occlusion and the tissue of the vessel wall, and stretching
5 tissue of a vessel wall that includes the vascular occlusion to create a path within the
6 tissue of the vessel wall.

1 69. (Previously added) A micro-dissection catheter for crossing vascular
2 occlusions, comprising:
3 a catheter shaft including a distal end and a longitudinal axis having at least one
4 lumen extending along the longitudinal axis of the catheter shaft;

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5 an assembly at the distal end of the catheter shaft including at least one jaw, the
6 jaw comprising a free distal tip and an atraumatic interior surface, wherein the interior
7 surface forms a partially continuous mating with a component of the assembly; and
8 an actuation assembly positioned along the catheter shaft, the movement of which
9 spreads the jaw and brings the free distal tip in contact with tissue of a blood vessel wall
10 and applies a force to the tissue that separates material of the vascular occlusion of the
11 blood vessel, wherein the jaw spreads by moving through an arc away from the
12 longitudinal axis of the catheter shaft with respect to a fixed pivotal position of a
13 proximal end of the jaw.

1 70. (Previously amended) An intravascular catheter, comprising:
2 a catheter shaft including a distal end and a longitudinal axis having at least one
3 lumen extending along the longitudinal axis of the catheter shaft;
4 an assembly at the distal end of the catheter shaft including at least one atraumatic
5 deflecting member, the deflecting member comprising a free distal tip, an exterior non-
6 mating surface, and an interior surface which mates to a component of the assembly,
7 wherein the deflecting member spreads by moving through an arc away from the
8 longitudinal axis of the catheter shaft with respect to a fixed pivotal position of a
9 proximal end of the deflecting member; and
10 an actuation assembly positioned along the catheter shaft, the movement of which
11 spreads the deflecting member to bring the exterior non-mating surface of the deflecting
12 member in contact with tissue of a blood vessel wall and applies a force to the tissue to
13 disrupt a vascular occlusion, wherein only the exterior non-mating surface of the
14 deflecting member contacts the tissue during spreading and subsequent closing of the
15 deflecting member.

1 71. (Previously added) The intravascular catheter of claim 70, wherein the
2 interior surface is continuous.

1 Claim 72. (Previously canceled)

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1 Claim 73. (Previously withdrawn)

1 74. (Previously added) The intravascular catheter of claim 70, wherein the
2 assembly is formed with a guidewire lumen that extends to a distal end of the assembly.

1 75. (Previously added) The intravascular catheter of claim 70, wherein the
2 assembly further includes a fixed extension that extends to a common point concurrent
3 with the free distal tip of the deflecting member when in the closed position, and wherein
4 the proximal end of the deflecting member is connected to the fixed extension with a
5 hinge pin to permit the free distal tip of the deflecting member to move away from the
6 fixed extension.

1 76. (Previously added) The intravascular catheter of claim 75, wherein the
2 assembly is formed with a guidewire lumen that extends to a distal end of the fixed
3 extension.

1 77. (Previously added) The intravascular catheter of claim 70, wherein the
2 deflecting member includes an integrally formed hinge.

1 78. (Previously added) The intravascular catheter of claim 70, wherein at
2 least one of the deflecting member and the assembly include at least one component of a
3 hinge

1 79. (Previously added) The intravascular catheter of claim 70, wherein the
2 assembly includes a hinge that is separately formed and pivotally couples the deflecting
3 member to the assembly.

1 80. (Previously added) The intravascular catheter of claim 70, wherein the
2 deflecting member is coupled to the assembly with at least one hinge pin to form at least

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3 one hinge that supports rotation of the deflecting member via force applied to the
4 actuation assembly.

1 Claims 81 and 82. (Previously withdrawn)

1 83. (Previously added) The intravascular catheter of claim 70, wherein
2 disrupting the vascular occlusion includes fracturing the vascular occlusion using the
3 force generated by the exterior non-mating surface of the deflecting member.

1 84. (Previously added) The intravascular catheter of claim 70, wherein
2 disrupting the vascular occlusion includes stretching tissue of a vessel wall that includes
3 the vascular occlusion using the force generated by the exterior non-mating surface of the
4 deflecting member, wherein the stretching creates a path between the vascular occlusion
5 and the tissue of the vessel wall.

1 85. (Previously added) The intravascular catheter of claim 70, wherein
2 disrupting the vascular occlusion includes stretching tissue of a vessel wall that includes
3 the vascular occlusion, wherein the stretching creates a path within the tissue of the
4 vessel wall.

1 86. (Previously added) An intravascular catheter, comprising:
2 a catheter shaft including a distal end and at least one lumen;
3 an assembly at the distal end of the catheter shaft including at least one deflecting
4 member, the deflecting member comprising a free distal tip with an exterior non-mating
5 surface and a smooth atraumatic interior surface that mates with an interior surface of a
6 component of the assembly, wherein the deflecting member spreads by moving through
7 an arc away from the longitudinal axis of the catheter shaft with respect to a fixed pivotal
8 position of a proximal end of the deflecting member; and
9 an actuation assembly positioned along the catheter shaft configured to open and
10 close the deflecting member, wherein opening includes spreading the deflecting member

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11 to apply a force to tissue of a blood vessel wall via the exterior non-mating surface of the
12 deflecting member in order to disrupt a vascular occlusion, wherein the smooth
13 atraumatic interior surface of the deflecting member deflects tissue from a space between
14 the interior surfaces of the deflecting member and the component during closing of the
15 deflecting member.

1 87. (Previously amended) A catheter system for use in blunt dissection,
2 comprising:
3 a catheter shaft including a distal end;
4 a working element at the distal end of the catheter shaft including at least one
5 deflecting member configured for spreading, wherein the deflecting member includes a
6 relatively smooth, atraumatic interior surface and an exterior non-mating surface; and
7 an actuation assembly positioned along the catheter shaft and coupled to the
8 deflecting member to translate a force to tissue of a vessel wall exclusively via the
9 exterior non-mating surface for disrupting an occlusion in the vessel, wherein movement
10 of the actuation assembly controls the spreading of the deflecting member by moving a
11 free distal tip of the deflecting member through an arc away from the longitudinal axis of
12 the catheter shaft with respect to a fixed pivotal position of a proximal end of the
13 deflecting member to bring the exterior non-mating surface of the deflecting member in
14 contact with tissue of a vessel wall.

1 88. (Previously amended) A catheter system for use in blunt dissection,
2 comprising:
3 a catheter shaft;
4 a working element at a distal end of the catheter shaft including at least one
5 spreading member, wherein the spreading member is configured to open and close, and
6 includes an exterior non-mating surface and an atraumatic, smooth interior surface; and
7 an actuation assembly positioned along the catheter shaft and coupled to the
8 spreading member to transfer a force to tissue of a vessel wall via the exterior non-mating
9 surface for disrupting an occlusion in the vessel, wherein the actuation assembly controls

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10 the opening of the spreading member by spreading a free distal tip of the spreading
11 member through an arc away from the longitudinal axis of the catheter shaft relative to a
12 fixed pivotal position of a proximal end of the spreading member, wherein the interior
13 mating surface of the spreading member deflects tissue from a space between the interior
14 mating surface of the spreading member and a smooth interior surface of at least one
15 component of the working element during closing of the spreading member.

1 89. (New) A micro-dissection catheter for crossing vascular occlusions,
2 comprising:
3 a catheter shaft including a distal end and a longitudinal axis having at least one
4 lumen extending along the longitudinal axis of the catheter shaft;
5 an assembly at the distal end of the catheter shaft comprising,
6 at least one jaw, connected to a fixed extension of the assembly with a
7 hinge to permit a free distal tip of the jaw to move away from the fixed extension, the jaw
8 comprising an atraumatic interior surface which continuously mates to a component of
9 the assembly, wherein the fixed extension extends to a common point concurrent with the
10 free distal tip of the jaw when in a closed position; and
11 a guidewire lumen that extends to a distal end of the fixed extension; and
12 an actuation assembly positioned along the catheter shaft, the movement of which
13 spreads the jaw and brings the free distal tip in contact with tissue of a blood vessel wall
14 and applies a force to the tissue that separates material of the vascular occlusion of the
15 blood vessel, wherein the jaw spreads by moving through an arc away from the
16 longitudinal axis of the catheter shaft with respect to a fixed pivotal position of a
17 proximal end of the jaw, wherein only an exterior surface of the jaw contacts the tissue
18 during spreading and subsequent closing of the jaw.